

Application No.: 10/564,985
Amendment under 37 CFR 1.111
Reply to Office Action dated December 28, 2007
March 26, 2008

AMENDMENTS TO THE CLAIMS

Please substitute the following claims for the pending claims with the same numbers respectively:

Claim 1 (Currently amended): A process for producing a phosphorus heterocyclic dimer according to formula (5) comprising the steps of:

reacting, in the presence of a ~~[[base]]~~ n-butyl lithium, primary phosphine represented by formula (1):

~~{Chem. 1}~~

R-PH₂ (1)

(wherein R represents a linear ~~[[,]]~~ or a branched, ~~or cyclic~~ alkyl group having 2 to 20 carbon atoms or a cyclic alkyl group having 3 to 20 carbon atoms) with a compound represented by formula (2):

~~{Chem. 2}~~

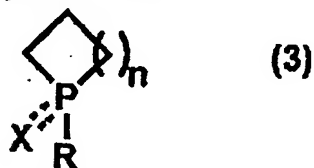
Y-C_nH_{2n}-Y (2)

(wherein Y represents a halogen atom or a leaving group selected from -OTs, -OTf, and -OMs, and n represents a number of 3 to 6);

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reacting ~~[[the]]~~ a product , which was obtained by said step of reacting primary phosphine represented by formula (1) with a compound represented by formula (2), with boron trihydride, oxygen, or sulfur to obtain a phosphorus heterocyclic compound represented by formula (3):

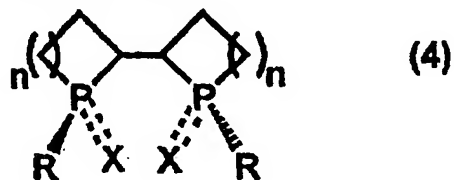
~~{Chem. 3}~~



(wherein R represents ~~the same as the above~~ a linear or a branched alkyl group having 2 to 20 carbon atoms or a cyclic alkyl group having 3 to 20 carbon atoms, ~~n represents a number of equals 1 to 4~~, X represents a boron trihydride group, an oxygen atom, or a sulfur atom, and == represents a single bond when X is a boron trihydride group or a double bond when X is an oxygen atom or sulfur atom);

dimerizing the ~~resultant compound~~ phosphorus heterocyclic compound represented by formula (3) to produce a phosphorus heterocyclic dimer represented by formula (4):

~~{Chem. 4}~~

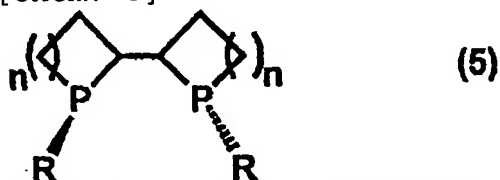


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(wherein R, ~~n~~, and ~~X~~ ~~represent the same as the above~~ represents a linear or a branched alkyl group having 2 to 20 carbon atoms or a cyclic alkyl group having 3 to 20 carbon atoms, n equals 1, X represents a boron trihydride group, an oxygen atom, or a sulfur atom); and [[then]]

removing oxygen, sulfur, or borane from the ~~resultant~~ phosphorus heterocyclic dimer represented by formula (4) to obtain an optically active phosphorus heterocyclic dimer represented by formula (5):

~~[Chem. 5]~~



(wherein R and ~~n~~ ~~represent the same as the above~~ represents a linear or a branched alkyl group having 2 to 20 carbon atoms or a cyclic alkyl group having 3 to 20 carbon atoms, n equals 1); and wherein said step of reacting the primary phosphine represented by formula (1) with the compound represented by formula (2) includes using 1,3-dichloropropane as the compound represented by formula (2).